Article 1i

NIAGARA SPRINGS STEELHEAD HATCHERY

1990 Brood Year Report

by

Jerry Mowery, Fish Hatchery Superintendent 111
Gary Bertellotti, Fish Hatchery Superintendent I

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ABSTRACT

Niagara Springs Fish Hatchery received 1,966,434 eyed eggs from Pahsimeroi Fish Hatchery and 113,190 eyed eggs from Oxbow Fish Hatchery, for a total of 2,079,624. Niagara Springs Fish Hatchery received egg shipments from April 9 through May 16, 1990.

A total of 632,030 lb of feed was used throughout the brood year, producing 484,025 lb of fish for a conversion of 1.31. The total feed cost for the year was $189,429.54, therefore, the cost per pound of fish was 39.10.

Spring smolt releases totaled 1,768,000 fish weighing 484,025 lb and averaging 3.65 fish/lb. Spring smolt releases included: 475,000 smolts (weighing 132,925 lb) into the Pahsimeroi River, 158,400 smolts (weighing 42,800 lb) into the North Fork Salmon River, 174,400 smolts (weighing 45,000 lb) into Salmon River at Ellis Bridge, 48,200 smolts (weighing 13,000 lb) into the Salmon River at Shoupe Bridge, and 912,000 smolts (weighing 250,300 lb) into the Snake River below Hells Canyon Dam.

Authors:

Jerry Mowery
Hatchery Superintendent III

Gary F. Bertellotti
Hatchery Superintendent I

INTRODUCTION

Niagara Springs Fish Hatchery, one of the largest privately owned steelhead hatcheries in the United States, is located in the Snake River Canyon, 10 mi south of Wendell, Idaho. The hatchery is owned and financed by Idaho Power Company (IPC) and operated and staffed by the Idaho Department of Fish and Game (Department). Niagara Springs Fish Hatchery is one of four hatcheries IPC owns to fulfill their mitigation requirement under the Federal Energy Regulatory Commission license. Niagara Springs Fish Hatchery is part of IPC's mitigation program for steelhead Oncorhynchus mykiss losses caused by the Hells Canyon hydroelectric projects.

The hatchery water is supplied by gravity flow from Niagara Springs Fish Hatchery, which is at a constant temperature of 58°F. IPC's water rights are 132 cubic feet per second (cfs) of the approximately 260 cfs of water from Niagara Springs. The spring supplies water to 20 upwelling incubators and 20 circular vats during hatching and early rearing. Spring water is delivered to 14, 300 ft x 10 ft x 3 ft raceways from June through April. Niagara Springs' water is also available for domestic use and irrigation of 10 acres of lawn.

Buildings on the hatchery grounds include: four residences (three wood frame houses and a mobile home); a metal building containing an office and two incubator rooms, a workshop and garage; a small storage building; and a building which stores a 20-ton chiller unit.

OBJECTIVES

The two goals of IPC are to enhance the steelhead trout run in the Snake River below Hells Canyon Dam and to relocate part of this run to the Salmon River and its tributaries. The two main objectives which must be met by Niagara Springs Fish Hatchery to achieve these goals are:

1. To rear 200,000 lb of steelhead smolts to be released in the Salmon River and its tributaries.

2. To rear 200,000 lb of steelhead smolts to be released in the Snake River below Hells Canyon Dam.

EGG SHIPMENTS AND EARLY REARING

Niagara Springs Fish Hatchery received shipments of eggs from both Pahsimeroi and Oxbow fish hatcheries. Pahsimeroi Fish Hatchery shipped 1,966,434 eyed steelhead eggs between April 9 and May 16, 1990. Oxbow Fish Hatchery shipped 113,000 eyed eggs between April 16 and April 23.

There was a 92.7% survival rate of eyed eggs to feeding fry from the Pahsimeroi Fish Hatchery and a 72.6% survival rate for the Oxbow Fish Hatchery stock.

At the point of 50% swim-up, fry were started on Rangen's semi-moist feed. Nursery feeding was done by sight until fry reached a size of 1500/lb. At this point, a feeding schedule was calculated which required feedings once per hour, ten times daily.

The Pahsimeroi Fish Hatchery fish were moved to outside raceways between May 22 and June 13. Eyed eggs received from the Oxbow Fish Hatchery arrived from April 16 through April 23, these fish were moved to outside nurseries on May 22, 1990. Eighty-five percent of the Oxbow Fish Hatchery eggs survived to hatch.

Vats for early fry rearing were only adequate for a short period. With a production goals of 400,000 lb of smolts, at 4.5 fish/lb, it was necessary to start with 2.1 million eggs. One week after swim-up, density indexes (D.I.) in the inside vats exceeded .60. By the end of the third week, D.I.s were in excess of 1.00.

Ideally, D.I.s of no more than .35 are recommended for steelhead trout production to maintain fish health and optimum growth rates. Since densities in the vats exceed the recommended D.I. for steelhead, fry were transferred outside to early rearing raceways at approximately 1,200/lb.

Brood Year (BY) 1989 steelhead smolt releases continued until May 2, 1991. Thus, preventing the BY90 fry from being moved outside. Densities in the fry vats of the early egg takes were in excess of .70 by that date, and it takes 8 to 10 days to scrape and chlorinate raceway bottoms and another 4 days to place and seal all screens and dam boards. Because existing incubators/vats were full, it was not possible to reduce densities and keep fry in the inside vats. Consequentially, fry were held in the vats until they were 1,200/lb, then transferred to outside raceways. At that point, D.I.s in the vats were in excess of 1.35 with increasing fish mortalities observed.

FEEDING

Niagara Springs Fish Hatchery used Rangen Inc. brand feed throughout BY90. The fry were started on Rangen's soft-moist diet and later switched to Rangen's Salmon dry diet.

A total of 632,030 lb of feed was used during BY90 at a cost of $189,429.54. A total of 484,025 lb of fish were raised for a conversion of 1.31 (Figure 1). The fish feed cost per pound of fish raised was 39.10.

Fish were fed by hand in the nursery vats and by electric Nielson Feeders in the outside nursery raceways. After fish were transferred to outside fry raceways, fish were fed medicated (Oxytetracycline) feed for 14 days. Once the

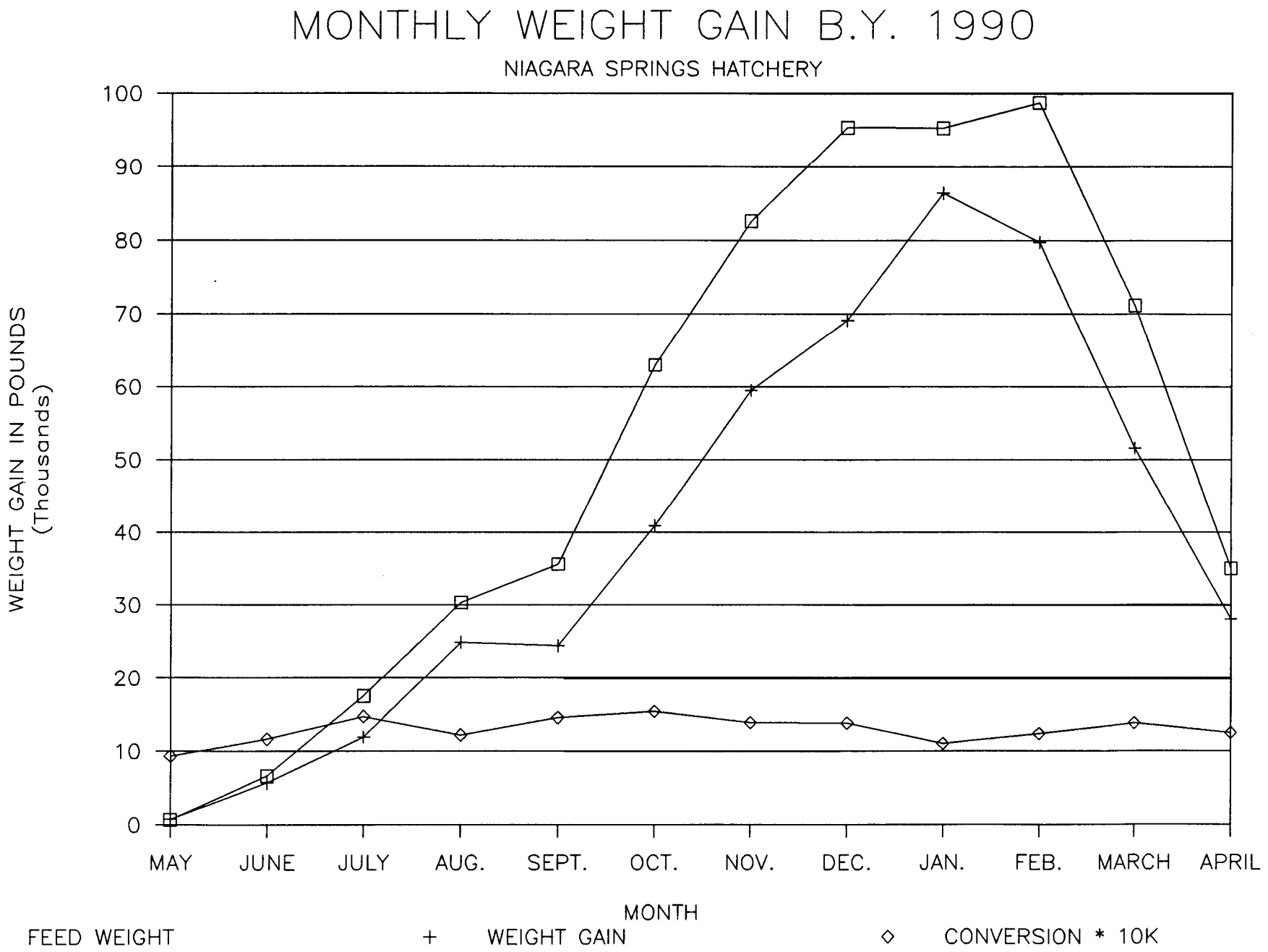

Figure 1. Monthly weight gain, pounds of feed used, and conversion at Niagara Springs Fish Hatchery for Brood Year 1990.

fish were 100/lb, Rangen's 3/32 pellets were fed from bridge mounted Nielsen Feeders. Fish were inventoried (pound counts) once per month to determine feeding rates.

FISH HEALTH

Disease prevention was done in various stages and with different chemicals. On May 16, 1990, all outside raceways were disinfected with a 12.5% chlorine solution. Upon arrival, and before being placed in incubators, all eyed eggs were disinfected with a 1:100 solution of argentyne for 10 min. During adipose fin clipping and coded wire tag (CWT) tagging, a prophylactic treatment of Benzalkonium Chloride was administered. One broom was used for each raceway and the brooms were periodically disinfected with iodine to prevent disease transmission.

Water flows and raceway volumes were increased as densities increased. Maximum flows (120 CFS) and volume (7500 cubic feet per raceway) were achieved by December 18, 1990. Flows decreased in March and April, dropping to 102 CFS, due to a fluctuation in flow from the spring and an increase in volume of water that Rimview Hatchery was using from the spring. Figure 2 shows average monthly water flows used during BY90.

Raceways were swept daily, with waste removed by a gravity flow pipe discharging into the settling pond.

Bacterial Cold Water Disease Flexibacter psychrophilus was a significant disease problem affecting BY90 fish. The first outbreak, in early December, was suspected to be Furunculosis Aeromonas salmonicida. The outbreak began when D.I.s reached and exceeded .35. The affected fish were put on Romet-30 medicated feed until the cause of mortality was identified as Flexibacter psvchrophilus by the Eagle Fish Health Lab. The treatment regime was changed, and TM-50 (oxytetracycline hydrochloride 4000 g/ton) medicated feed was fed for 14 days; treatment of later outbreaks was changed to 14 days of TM-100 (Oxytet. Hydrochl. 8000 g/ton). This treatment, although effective in controlling mortality, did not perform as expected. As the D.I. increased past 0.35 in January, February, and March, mortality associated with F. psychrophilus increased. Chronic mortality progressed into an acute situation as the D.I. increased to near 0.5 (Figure 3). Outbreaks of F. psychrophilus occurred every 30 days with an increase in mortality up to .10%/d. Mortality increases (frequency and number of morts) occurred more often as the densities approached .50. Mortality and a decrease in the effectiveness of the medicated feed was especially apparent in March and April when densities exceeded .50.

A total of 1,100 lb of Romet-30 was fed during the first Bacterial Cold Water disease outbreak in December; 44,190 lb of TM-50 and 64,510 lb of TM-100 were fed in subsequent outbreaks in January, February, and March.

As densities increased, the quality of the raceway environment deteriorated. High densities combined with fish activity (while feeding) caused a substantial decrease in dissolved oxygen levels (head race >9.0 ppm to <4.0 ppm at the tail

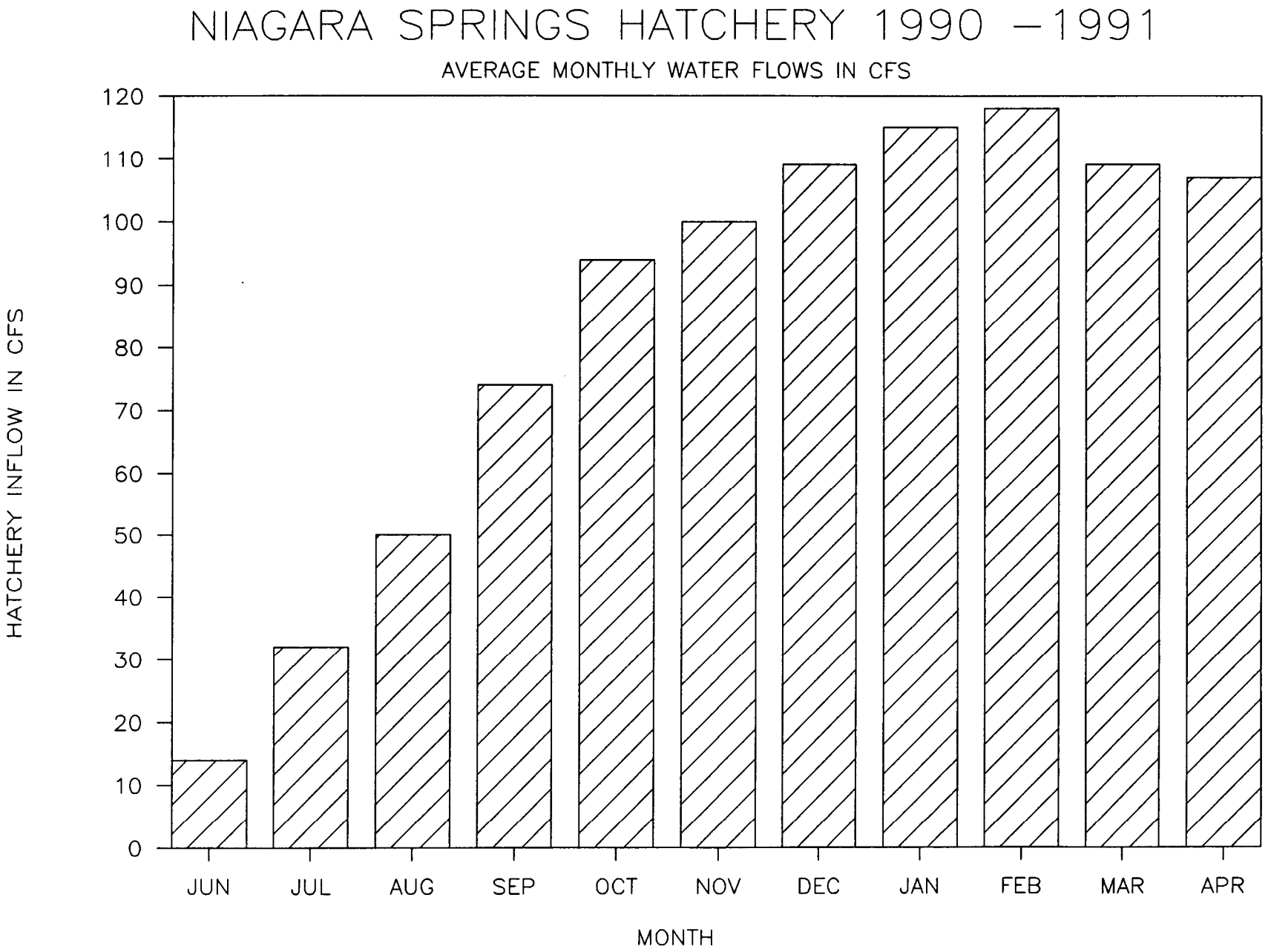

Figure 2. Average monthly water flows at Niagara Springs Fish Hatchery for Brood Year 1990.

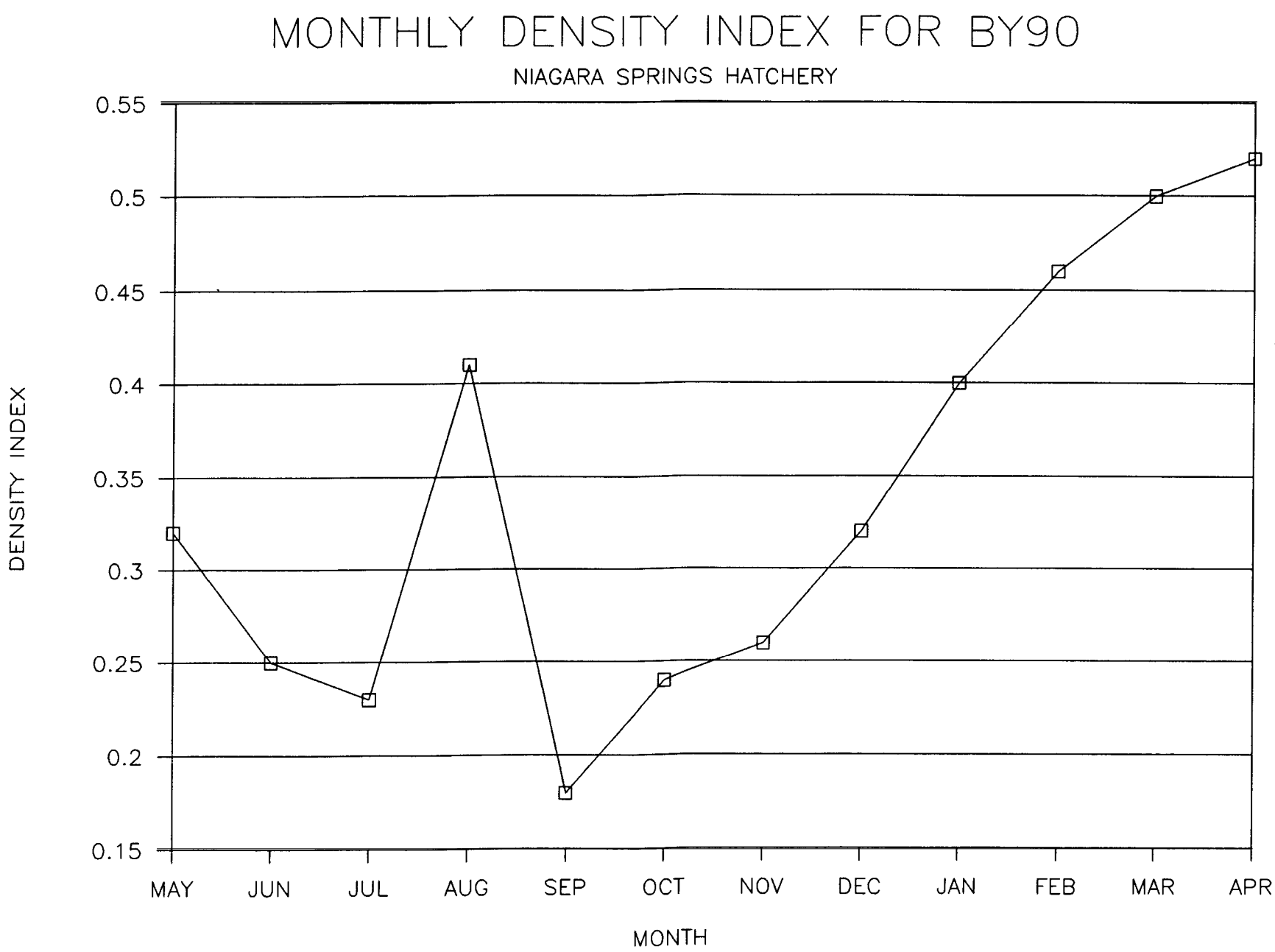

Figure 3. Average monthly density indices at Niagara Springs Fish Hatchery for Brood Year 1990.

screens). Overcrowding, low dissolved oxygen, and other stressful conditions became critical to fish health at a .35 D.I. and higher.

During a quiescent zone experiment in April, the Eagle Fish Health Lab identified Furunculosis in fish originally from raceway O. With this confirmed diagnosis just 2 days before releasing these fish into the Snake River at Hells Canyon, there was no time for treatment. Stress caused by high densities (≥0.5) and low dissolved oxygen (5.0 ppm, 3.5 ppm after feeding) made fish more susceptible to the bacterial infection.

FISH MARKING

Fin Clipping

Between August 28 and September 17, 1990, a fin clipping crew removed adipose fins on all steelhead. Adipose fins are clipped on hatchery steelhead to help protect the "wild" run of steelhead in Idaho. Anglers are able to identify "wild" run steelhead because of the presence of the adipose fin.

Coded-Wire-Taaaing

Between October 3 and October 13, 1990, 207,207 steelhead received coded-wire-tags (CWT). Of the CWT fish, 65,273 were released at the Pahsimeroi trap; 68,571 were released into the North Fork Salmon River; and 68,401 were released into the Salmon River at Shoupe Bridge. The purpose of the CWT project is to help evaluate release sites as they pertain to smolt survival and adult returns, as well as contribution to the fisheries. All CWT fish were marked with a left ventral (LV) clip to help biologists and anglers identify CWT fish. Tag data is summarized in Table 1.

Pit tags were given to 1,000 smolts to assess downstream migration. Of these fish, 500 tagged steelhead were released into the North Fork, and 500 were released into the Pahsimeroi River.

FISH RELEASES

Spring smolt releases began on April 8 and ended May 2, 1991. The Salmon River and its tributaries received 856,000 smolts weighing 233,725 lb. The number of fish per pound averaged 3.66, with an average length of 8.81 in.

The Snake River received 912,000 smolts weighing 250,300 lb. The number of fish per pound averaged 3.64, with an average length of 8.82 in. See Table 2 for a summary of spring smolt releases. Total smolt releases for BY90 were 1,768,000 fish for a total of 484,025 lb.

Table 1. Brood Year 1990 coded-wire-tag summary for steelhead at Niagara Springs Fish Hatchery.

CWT #	Number tagged	Mortality to release	Total tags	% Tag retention	Tagged fish released	Release site
10-43-23	21,753	458	21,295	96.50	20,550	Pahsimeroi
10-43-27	22,896	440	22,456	99.43	22,328	Pahsimeroi
10-43-28	23,164	389	22,775	98.33	22,395	Pahsimeroi
TOTALS	67,813	1,287	66,526		65,272	
10-43-24	22,270	305	21,965	98.36	21,605	North Fork
10-43-25	24,515	336	24,179	98.36	23,782	North Fork
10-43-26	22,929	314	22,615	98.36	22,244	North Fork
TOTALS	69,714	955	68,759		67,631	
10-43-29	24,034	321	23,713	98.17	23,279	Ellis Bridge
10-43-30	23,113	308	22,805	98.17	22,388	Ellis Bridge
10-43-31	22,533	301	22,232	98.17	21,825	Ellis Bridge
TOTALS	69,680	930	68,750		67,492	
TOTAL CWT RELEASES	207,207	3,172	204,035	98.17	200,396	

Table 2. Brood Year 1990 spring release dates, sites, number of pounds, number of fish, and size of fish (number per pound) released from Niagara Springs Fish Hatchery.

Release date	Release site	Number of Pounds	Number of Fish	Number per pound
04\08-04\14\91	Pahsimeroi River	132,925	475,000	3.57
04\18-04\23\91	North Fork	42,800	158,400	3.70
04\15-04\17\91	Ellis Bridge	45,000	174,400	3.88
04\18\91	Shoupe Bridge	13,000	48,200	3.71
04\22-05\02\91	Hells Canyon	250,300	912,000	3.64
TOTALS		484,025	1,768,000	3.65

Smolts were hauled using two IPC tankers and three Lower Snake River Compensation tankers which were pulled by private contract drivers.

HATCHERY IMPROVEMENTS

Improvements to the hatchery grounds included installing safety fencing around the settling pond, hatchery entrance and Rimview's head ditch. Safety fencing was also installed at Niagara Springs overlook and along the bridge across Niagara Springs. Pavement on the station was resurfaced and a new 3-in asphalt mat was laid under the feed conveyor.

HATCHERY NEEDS

Facilities at Niagara Springs Fish Hatchery were originally designed to rear 200,000 lb of steelhead smolts, using a maximum flow of 56 cfs. Recent production has doubled, but the facility has not been improved to compensate for this increase. The waste water cleaning system needs to be modified and/or expanded to meet current EPA requirements.

Tail screens need to be moved forward to create a quiescent zone for the settling of solid waste. Key ways will need to be installed to accommodate this situation. At full production, smolt activity keeps solid waste in suspension allowing it to enter Niagara Springs Creek and the Snake River. Even during cleaning, when water is diverted to the settling pond from the tail end of the raceways, only 50% of the flow goes to the settling pond. Management practices, or alterations to the waste water cleaning system, are imperative to remain within EPA regulation compliance. Further research is required to determine the optimum size of the quiescent zone and\or alterations that need to be implemented. Additional raceways are needed to maintain fish densities under a .35 D.I.

Screens and frames, for early fry production, are worn and need replacement. Fry screens have wooden frames and require a great deal of maintenance every year (scraping, painting, repairing mesh screens and repairing joints). The wood frames and steel mesh screening are also short lived under raceway conditions. For a permanent solution, screens and frames should be constructed from stainless steel or aluminum. All other raceway screens should also be converted to similar materials over the next few years. Bird screening and shade cover would also help with fish health and bird predation.

Safety concerns for employees are also being identified. Both the head and tail ends of the raceways are hazardous work areas with no safety protection provided. A metal grate cover over the head race and tail race should be installed as well as nonskid catwalks. This would provide a safe work surface for employees. Bridge decking currently consists of 2-in x 12-in boards which are replaced about every 2 years. As these boards swell and shrink during the year, the hatchery staff continually adds or removes boards to maintain a flat surface. These boards also become slippery when wet, frosted, or snow covered.

A non-skid grating would be more practical, safer, and, in the long run, more economical. Electrical outlets and connections on the bridge should be waterproof and the whole system put on a ground fault protection circuit.

Incubation and early rearing facilities must be enlarged and modified to accommodate the 2.1 million eggs and fry that are needed to meet the FERC licensing agreement. Incubation and rearing vats need to be four times the volume of the present system. The drain line to the settling system from the incubation rooms must be enlarged to accommodate the volume of water being used. Presently, water and fish waste from early rearing vats overflow into the driveway, the shop, and down to Niagara Springs Creek, instead of into the settling pond.

The main hatchery building is also in need of improvement. The shop area and incubator room #2 need to be insulated/heated. During colder weather, the lines to the incubator rooms freeze. The working area in the shop has also been greatly decreased because of inadequate storage space. This problem would be solved by building additional storage.

A three-bay, insulated and heated garage would solve storage problems and allow us to protect valuable equipment from the weather. Currently, items such as: the hatchery truck, fish pumps (old and new), and the boat are stored outside. Some equipment and chemicals are stored in the feed room, which is insulated and heated. Essential working space in the shop and shed is currently utilized for storage of pumps, lawn mowers, tools, and other valuable machinery. If a garage was added, these items, along with other essential equipment, could be properly stored. A special insulated and heated room would need to be incorporated into this building for storage of paints, chemicals, gasoline, and oil.

A fourth house is needed to replace the trailer house which is currently used by one permanent employee. The heating system in the trailer house is inadequate during cold weather (indoor temperatures drop into the low 50s during cold months). The air conditioner is also unable to keep the trailer cool during the summer months. If a new house were built, the trailer could be used to provide housing for temporary employees.

The three houses that are on the facility are in need of major maintenance and repair. This year there were three major electrical shorts that presented potential hazard to personal property and personal safety. All outlets were replaced in the houses because of the potential shock danger. During this replacement process, worn wiring, incorrect circuitry, and other hazardous electrical problems were discovered.

Outside siding and window cases on all residences are in an advanced stage of deterioration. IPC shop maintenance workers examined the houses and suggested replacement of a these items.

Two other needs were also identified. The public rest rooms on this facility are not designed to accommodate handicap people. Also, an enclosed well system, or at least additional contact time with chlorine, is needed for safe drinking water for the public and residences.

ACTIVITIES AND STAFF

Numerous slide shows and tours were given to school groups, scout groups, and visitors. Hatchery personnel assisted at the Oxbow Fish Hatchery with steelhead spawning. Hatchery personnel have also assisted in an Angler Survey conducted at Crystal Springs Lake by the regional fishery biologist. Hats were given away as a reward for returned jaw tags in conjunction with this survey.

The hatchery staff at Niagara Springs Fish Hatchery includes: Jerry Mowery, Superintendent III; Gary Bertellotti, Superintendent I; Rob Morris, Fish Culturist (replaced Tom Herron who transferred to Sawtooth Fish Hatchery); and Dan Baker, Fish Culturist. The temporary employees included: Paul Wert, Bio-Aide, and Rebecca Skinner, Laborer.

Submitted by:

Jerry Mowrey
Fish Hatchery Superintendent III

Gary Bertellotti
Fish Hatchery Superintendent I

Approved by:

IDAHO DEPARTMENT OF FISH AND GAME

Steven M. Huffaker
Chief, Bureau of Fisheries

Bill Hutchinson
Fish Hatcheries Manager